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Declarations under Rule 4.17:

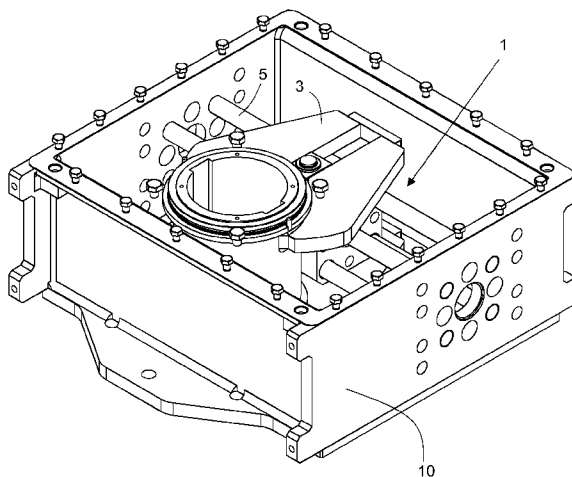
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
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(54) Title: VALVE ACTUATOR

FIG. 1



(57) Abstract: A valve actuator device (1) of the type adapted to convert a reciprocating rectilinear motion into a reciprocating angular motion and vice versa in valve actuators, of the type comprising a sleeve (2) adapted to be keyed to a corresponding rotation driving shaft, a slider (4) sliding along linear guides (5), one or more forks (3) integral with the sleeve (2) for holding an element (6) extending from said slider (4) in the gap (3b) between its prongs, to generate a translational motion upon rotation of the sleeve (2) and vice versa. Three or more equally spaced rods (5) are provided for guiding the slider (4), and are arranged to define the vertices of a regular polygon with the center of application of the stem (11) or the center of gravity of the slider (4), to prevent any torque or rotation moment (4) from building up on the slider (4) as it slides on the rods (5).

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TITLE: VALVE ACTUATOR

DESCRIPTION

The present invention relates to a valve actuator, i.e. a device for converting a reciprocating rectilinear motion into a reciprocating angular motion and vice versa.

Devices are known to be used in the art of valve actuators for converting the rectilinear motion of an actuator into a rotary motion of a valve stem, or vice versa, by a mechanism known as sliding block linkage.

Namely, a sliding block linkage allows conversion of the uniform rotary motion of a flywheel driven by a motor into a reciprocating rectilinear motion.

The object of the present invention is to provide a device for valve actuators that can ensure conversion of reciprocating linear motion into reciprocating rotary motion and vice versa, with features to:

- reduce friction of moving parts,
- optimize the distribution of sliding components by using a number of rectilinear guiding rods, in such an arrangement as to neutralize any torque on the device

These objects and advantages are achieved by a device for converting a reciprocating rectilinear motion into a reciprocating angular motion and vice versa, according to the present invention, which is characterized by the annexed claims.

This and other features will be more apparent from the following description of a few embodiments, which are shown by way of example and without limitation in the accompanying drawings, in which:

- Figure 1 is a perspective view of a drive device

for valve actuators of the present invention

- Figure 2 shows the motion conversion device proper of the device as shown in Figure 1,

- Figure 3 shows the slider and the guiding rods of the linear translation mechanism of the device of Figure 1,

- Figure 4 is a top view of the device of Figure 2.

Referring to Figures 1, 2, 3 and 4, numeral 1 generally designates a valve actuator, i.e. a device for converting a reciprocating rectilinear motion into a reciprocating angular rotary motion.

Namely, the device 1 comprises a case 10 for housing the rectilinear/rotary motion converting components.

Here, a sleeve 2 may be seen, here having a hollow cylindrical section, which is adapted to be keyed to a corresponding shaft (not shown) such as a valve driving shaft or the like, to cause rotation about its axis A1.

A pair of forks 3 extend perpendicular to the axis A1 of said sleeve 2, and are adapted to hold a an element 6 in the gap or groove 3b created between the fork prongs, which element projects vertically, along the axis A3, from a slider 4 and is attached thereto, for instance, by suitable threads.

The above part 6 may be of any shape whatever, as long as it may be keyed into the corresponding groove 3b.

The above slider 4 is capable of linear sliding motion, due to the action of a stem 11 which is in turn controlled, for example, by a hydraulic or pneumatic cylinder and is free to slide on equally spaced guiding rods 5, relative to the center of application of the

stem 11 of the slider 4

The guiding rods 5 are integral with two inner, opposite walls of the case 10 and their purpose is to prevent torques or rotation moments from building up on the slider 4 as the latter slides along the rods 5.

The center of application of the stem 11 on the slider will preferably correspond to the center of gravity of the latter.

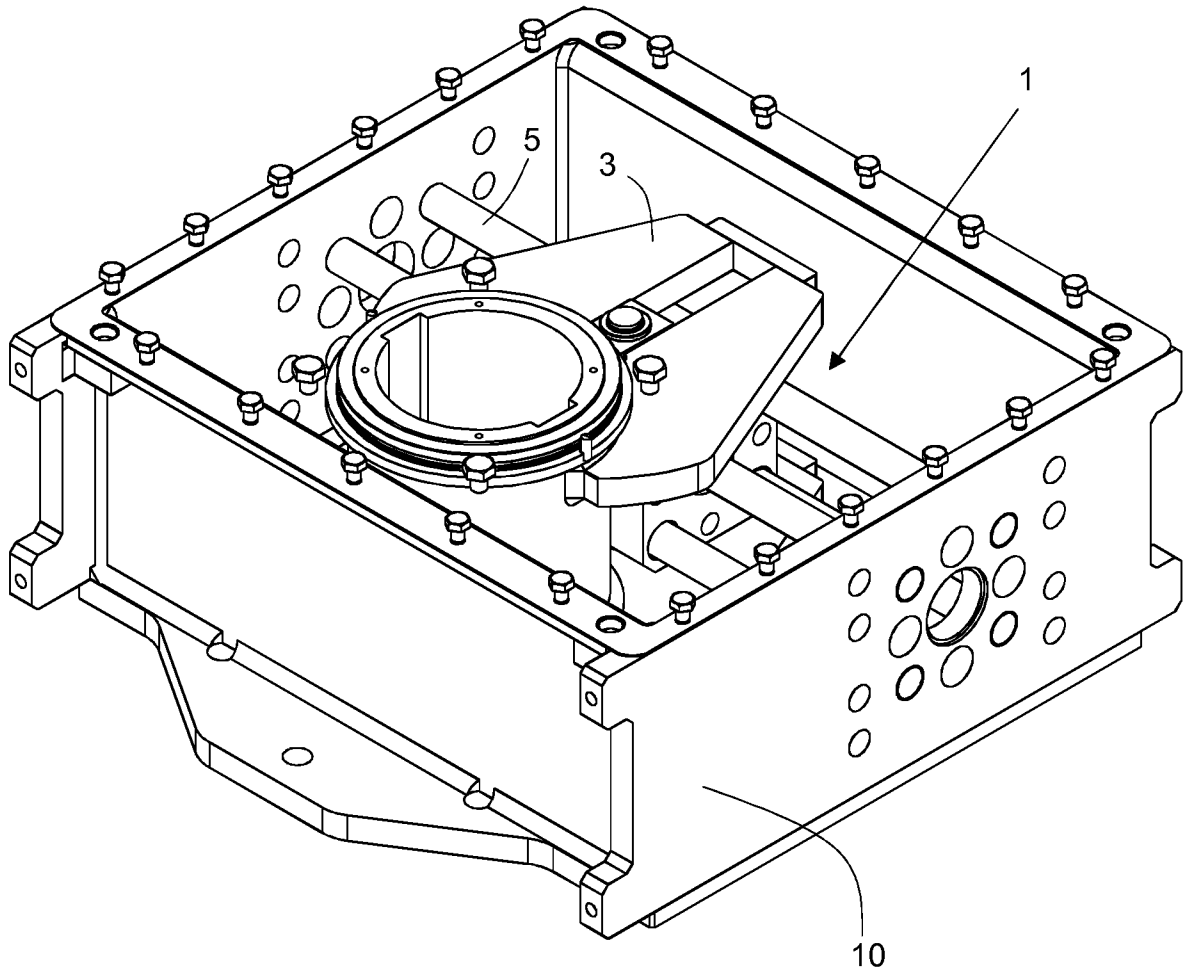
Therefore, the slider 4 will be displaced by a linear motion, perpendicular to the above axes A1 and A3, as shown by the reference A2, to cause linear motion upon rotation of the sleeve 2: the guiding rods 5 are obviously perpendicular to the axis of the sleeve 2, for rectilinear/rotary motion conversion.

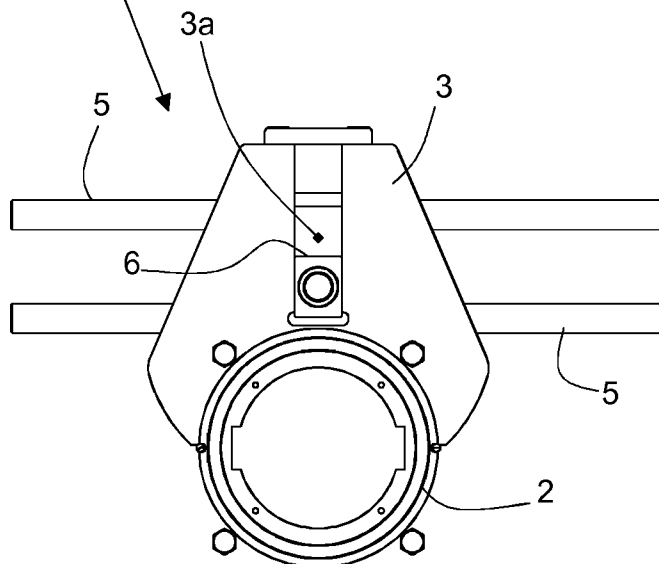
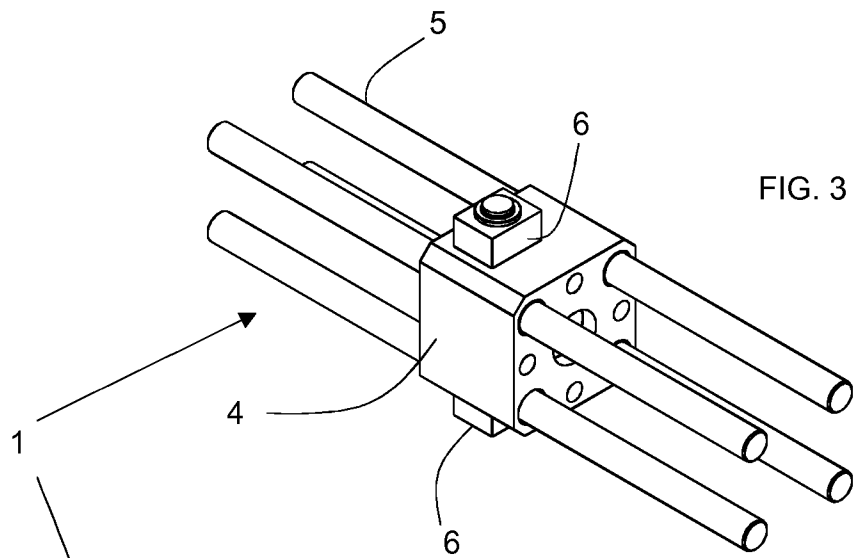
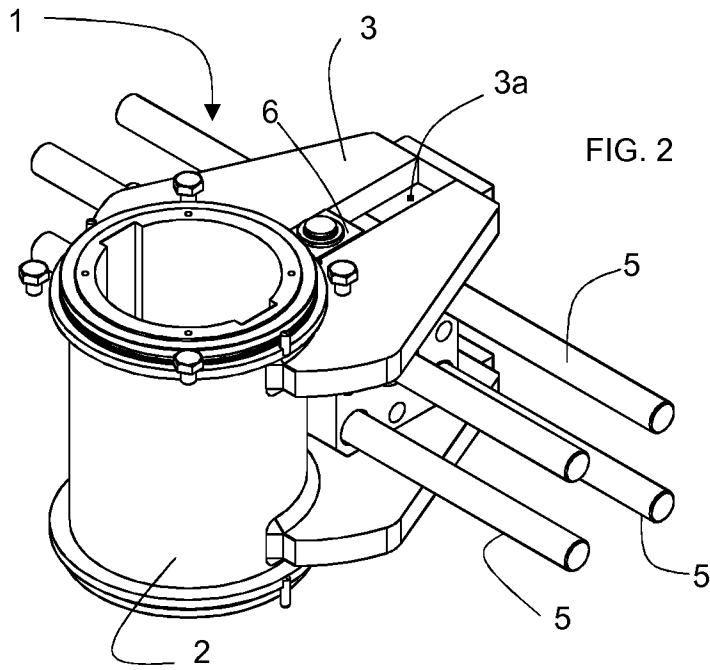
While the embodiment as shown herein has four guiding rods 5, there may be also three or more of such guides, without departure from the scope of the invention, which are all equally spaced from the center of application of the stem 11, i.e. arranged at the vertices of a regular polygon whose center of gravity is the center of application of the stem 11.

CLAIMS

1. A valve actuator (1) of the type adapted to convert a reciprocating rectilinear motion into a reciprocating angular motion and vice versa in valve actuators, of the type comprising a sleeve (2) adapted to be keyed to a corresponding rotation driving shaft, a slider (4) sliding along linear guides (5), one or more forks (3) integral with the sleeve (2) for holding an element (6) extending from said slider (4) in the gap (3b) between its prongs, to generate a translational motion upon rotation of the sleeve (2) and vice versa, characterized in that it comprises three or more equally spaced rods (5) for guiding the slider (4), and arranged to define the vertices of a regular polygon with the center of application of the stem (11) or the center of gravity of the slider (4), to prevent any torque or rotation moment (4) from building up on the slider (4) as it slides on the rods (5).
2. An actuator (1) as claimed in claim 1, characterized in that the slider (4) will be displaced by a linear motion, perpendicular to the axis (A1) of the sleeve (2), to cause linear motion upon rotation of the sleeve (2).

FIG. 1





INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER INV. F16K31/528		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) F16K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 929 024 A (SHEESLEY JOHN M ET AL) 30 December 1975 (1975-12-30) column 1, line 55 - column 3, line 25; figures	1,2
X	----- US 3 910 165 A (SHEESLEY JOHN M ET AL) 7 October 1975 (1975-10-07) column 1, line 58 - column 3, line 8; figures	1,2
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		
<input checked="" type="checkbox"/> See patent family annex.		
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A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family	
Date of the actual completion of the international search <p style="text-align: center; font-weight: bold;">14 May 2009</p>	Date of mailing of the international search report <p style="text-align: center; font-weight: bold;">20/05/2009</p>	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <p style="text-align: center; font-weight: bold;">Rusanu, Irina</p>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3929024	A	30-12-1975	NONE
US 3910165	A	07-10-1975	NONE